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Conditions for Robustness to Nonnormality on Test Statistics in a GMANOVA Model

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Abstract: This paper presents the conditions for robustness to the nonnormality on break three test statistics for a general multivariate linear hypothesis, which were proposed under the normal assumption in a generalized multivariate analysis of variance (GMANOVA) model. The proposed conditions require the cumulants of an unknown population's distribution to vanish in the second terms of the asymptotic expansions for both the mean and variance of the test statistics. With the proposed conditions, the test statistic can be investigated for robustness to nonnormality of the population's distribution. When the conditions are satisfied, the Bartlett correction and the modified Bartlett correction in the normal case improve the quality of the chi-square approximation even under nonnormality.

Key words: actual test size, asymptotic expansion, Bartlett correction, chi-square approximation, general multivariate linear hypothesis, modified Bartlett correction

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